

**ABSTRACT****REED-SOLOMON DECODER AND DECODING METHOD  
FOR ERRORS AND ERASURES DECODING**

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A single polynomial expander 22 is time multiplexed to produce firstly a modified syndrome polynomial  $T(x)$  and  
10 then an erasure located polynomial  $\Lambda(x)$ .  $T(x)$  is supplied to a key equation solving unit 32 which solves the key equation to calculate an error locator polynomial  $\sigma(x)$  and an errata evaluator polynomial  $\omega(x)$ . These polynomials  $\sigma(x)$ ,  $\Lambda(x)$  and  $\omega(x)$  form three inputs to polynomial  
15 evaluators 52-56 and a Forney block 62 for determining the location and magnitude of each symbol error and symbol erasure, allowing the received codeword to be corrected in a correction block 72. Optionally, a transform block 42 is provided to avoid unnecessary delay and improve  
20 throughput when decoding shortened codewords.

[Figure 2]